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CARNEGIE MUSEUM OF NATURAL HISTORY

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VOLUME 45 DECEMBER 30, 1975 ARTICLE 16

PALEONTOLOGY OF THE EARLIEST OLIGOCENE DEPOSITS IN JACKSON HOLE, WYOMING

Part 1. Rodents exclusive of the Family Eomyidae

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INTRODUCTION

During the summer of 1971, Sutton began field work in Jackson Hole in connection with continuing broad research on faunas of intermontane, potentially high altitude, aspect (Robinson et al., 1968). Attempts were being made to look at all the accessible outcrops of the Miocene Colter Formation. Near the end of the summer, a small outcrop of Oligocene deposits was discovered along Pilgrim Creek in the Teton National Forest, Jackson Co., Wyoming. This outcrop lies between the lower part of the Colter Formation and another outcrop. The latter was thought to be a Miocene intrusive, although recently there have been doubts about its intrusive nature (J. D. Love, personal communication). Pilgrim Creek has cut down through the Miocene contact on the south bank and mudslides have covered the remaining contacts.

The outcrop appears to be composed, at least partially, of landslide deposits, as there are unbedded coarse pebbles, clays, and large quartz grains throughout half of the deposit. The remainder of the outcrop, which is much finer grained, seems to be less disturbed, but no bedding or structure can be seen. Both areas of the outcrop yield the same vertebrate fossils, most of which appear to be Chadronian in age. The assemblage, however, is perhaps slightly different from other Chadronian faunas, like those from Pipestone Springs and McCarty's Mountain in Montana. Some of the species appear to be transitional between late Eocene and early Oligocene forms.

Submitted for publication June 20, 1975.

Very few jaws have been recovered from these deposits. Most of the specimens are isolated teeth. The bone scrap is usually broken into extremely small pieces and is generally angular rather than rounded. Indications are that the bone was broken after deposition.

The locality was revisited briefly during the summers of 1972, 1973, and 1974. In 1971, approximately 200 pounds of matrix were washed and a few teeth recovered from the concentrate. Additional samples were washed in successive visits, so that perhaps 14,000 pounds of matrix have been washed from the site to date. Not all the concentrate from the 1974 season has been processed.

Washing has produced a varied micromammalian assemblage represented almost entirely by isolated teeth. Considering the limited amount of outcrop and its coarse nature, it is extremely doubtful that future work will provide substantially more complete material for any of the species present. During the spring high-water stages of 1974, some 50% of the productive portions of the outcrop was eroded and lost down Pilgrim Creek.

While the small-mammal fauna is rather diverse, this paper deals with rodents exclusive of the family Eomyidae. Other groups will be dealt with in later contributions.

This work was supported by grants GB-7801 and GB-30840X from the National Science Foundation to Black, and in 1973, by a grant to Sutton from the Graduate School of Texas Tech University. All specimens are in the collections of Carnegie Museum of Natural History. The following abbreviations are used throughout: KU, The University of Kansas; CM, Carnegie Museum of Natural History; UCMP, University of California, Berkeley, Museum of Paleontology; USNM, United States National Museum of Natural History; a-p, anteroposterior; tr, transverse. Where two transverse measurements are given, the first is the anterior loph (id) and the second is the posterior loph (id). All measurements are in millimeters, and were taken with a filar micrometer.

Following are the rodents from the Pilgrim Creek fauna discussed in this paper:

Ischyromyidae
  Ischyromys cf. *I. veterior*
Cylindrodontidae
  Pseudocylindrodon nr. *P. medius*
  Cylindrodon cf. *C. fontis*
?Sciuridae
  Sciurid indet.
Aplodontidae
  Spurimus sp.

Prosciurus vetustus
Prosciurus cf. *P. relictus*
Prosciurus sp.
Heteromyidae
Heliscomys cf. *H. vetus*
?Castoridae
Pipestoneomys cf. *P. bisulcatus*
Family indet.
Griphomys sp.

SYSTEMATIC REVIEW

Family Ischyromyidae Alston, 1876

Genus *Ischyromys* Leidy

Ischyromys cf. *I. veterior*

Figures 1-7, Table 1

MATERIAL: CM 27564, LP^4; 27565, RP^4; 27558, $LM^{1 \text{ or } 2}$; 27563, $LM^{1 \text{ or } 2}$; 27566, $RM^{1 \text{ or } 2}$; 27572, $LM^{1 \text{ or } 2}$; 27560, RM^3; 27561, RP_4; 27562, LP_4; 27571, LP_4; 27573, $LM_{1 \text{ or } 2}$; 27557, $RM_{1 \text{ or } 2}$; 27567, $LM_{1 \text{ or } 2}$; 27568, $LM_{1 \text{ or } 2}$; 27569, $LM_{1 \text{ or } 2}$; 27570, $RM_{1 \text{ or } 2}$; 27555, LM_3.

DESCRIPTION: The upper premolars are typical of *I. veterior* in that they have the extended anterior cingulum and distinct lingual notch with subequal protocone and hypocone. The metaloph is flexed anteriorly before it joins the hypocone, as Wood (1937) points out. In contrast to Wood's description, however, there is no excavation or concavity of the paracone on the premolars or any of the molars. The protoconule is distinguishable on the upper teeth, but is less well developed on CM 27564, 27566, and 27572. CM 27566 also has a distinct mesostyle on the buccal margin of the tooth. The M^3 is similar to the other molars, but is slightly narrower across the metaloph.

The lower premolars are elongate and narrow anteriorly with a posteriorly closed trigonid. The trigonid is open anteriorly. The remainder of the tooth is well developed, with a strong hypolophid and posterior cingulum that meets the entoconid. The buccal groove is deep and posteriorly directed. The molars are not elongate and are typical of *Ischryomys* as adequately described by Wood (1937) and Howe (1966). There are indications of a spur running from the posterior face of the protoconid into the anterior basin on CM 27567 and CM 27557. This structure is only slightly developed and is difficult to see. On CM 27573, however, the spur is well developed and extends far into the basin where it is met by another very short spur arising on the anterior side of the hypolophid. The M_3 is similar in construction to the anterior molars except for the posterior narrowing of the tooth.

DISCUSSION: The teeth fall within the range for *I. veterior* (Black, 1968) in most cases and appear to be generally a good representation of

that species. Some of the teeth, however, exhibit tendencies that are reminiscent of *I. douglassi* (Black, 1968) from McCarty's Mountain, Montana. Several of the lower molars have the spur on the back of the protoconid, and several have a well developed hypoconulid, characters found in *I. douglassi.* It is possible that we are dealing with a population of *I. veterior*-like rodents that gave rise at a later date to the distinct species *I. veterior* and *I. douglassi.* The Pilgrim Creek *Ischyromys* thus seems to be older than either the Pipestone Springs or McCarty's Mountain, Montana, forms.

TABLE 1. MEASUREMENTS OF *Ischyromys* CF. *I. veterior*

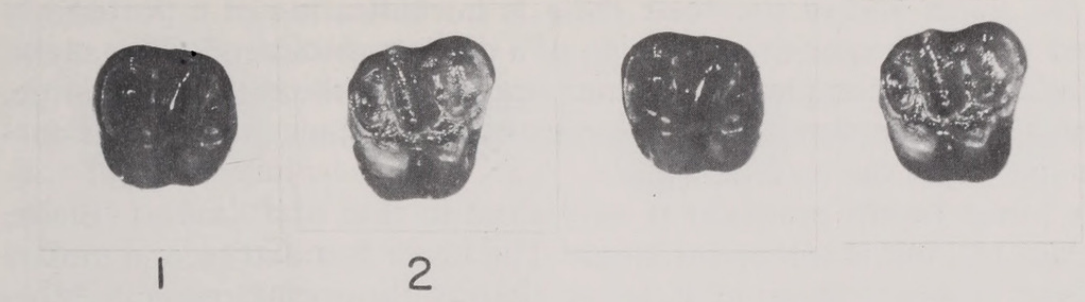
		N	X	O.R.
P^4	a-p	2	3.23	3.00-3.47
	tr	2	3.09	2.90-3.28
	tr	2	2.73	2.57-2.90
$M^{1 \text{ or } 2}$	tr	4	3.33	3.08-3.65
	tr	3	2.65	2.55-2.70
	tr	3	2.54	2.30-2.74
M^3	a-p	1	3.20	—
	tr	1	2.71	—
	tr	1	2.10	—
P_4	a-p	3	3.54	3.33-3.66
	tr	3	2.26	2.11-2.45
	tr	3	2.60	2.47-2.63
$M_{1 \text{ or } 2}$	a-p	7	3.15	2.80-3.50
	tr	7	2.62	2.25-2.95
	tr	6	2.81	2.37-3.00
M_3	a-p	1	2.90	—
	tr	1	2.78	—
	tr	1	2.39	—

Family Cylindrodontidae Miller and Gidley, 1918
Genus *Pseudocylindrodon* Burke
Pseudocylindrodon nr. *P. medius*
Figures 13-17, Table 2

MATERIAL: CM 27531, LP^4; 27532, $LM^{1 \text{ or } 2}$; 27534, LP_4; 27535, $LM_{1 \text{ or } 2}$; 27536, $LM_{1 \text{ or } 2}$; 27537, $RM_{1 \text{ or } 2}$; 27538, $RM_{1 \text{ or } 2}$; 27539, LM_3; 27540, RM_3.

DESCRIPTION: The cheek teeth are in general quite similar to those of *Pseudocylindrodon medius* (Burke, 1938; Black, 1974) although they do exhibit some minor differences.

Figs. 1-7. *Ischyromys* cf. *I. veterior.* All x 4. 1. CM 27564, LP^4. 2. CM 27566, $RM^{1 \text{ or } 2}$. 3. CM 27560, RM^3. 4. CM 27567, $LM_{1 \text{ or } 2}$. 5. CM 27573, $LM_{1 \text{ or } 2}$. 6. CM 27568, $LM_{1 \text{ or } 2}$. 7. CM 27555, LM_3. Figs. 8-10. *Spurimus* sp. All x 7. 8. CM 27552, RdP^4. 9. CM 27551, LP^4. 10. CM 27548, LP_4.



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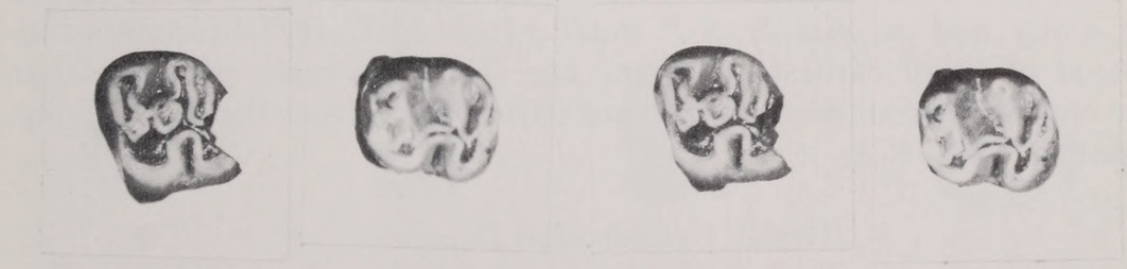

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9 10

In the upper fourth premolar there is no indication of a posteriorly divided metaloph spur or much sign of a distinct metaconule. The metaloph is, however, complete. In the one upper molar the mesostyle is large, the metaloph complete, and the metaconule indistinct. There is no posterior spur from the metaloph.

The lower fourth premolar is very close to that of *P. tobeyi* (Black, 1970, fig. 13), but is somewhat larger. The lower first and second molars are closer in size to those of *P. tobeyi* than to those of *P. medius*. Morphologically, the lower molars appear to be closer to those of *P. medius* in the degree of central and posterior valley closure and in the size and direction of the hypoconid, although one tooth, CM 27538, resembles an M_1 of *P. tobeyi* more than it does those of *P. medius*. The sample also appears to be slightly higher crowned than are the molars of *P. tobeyi*. M_3 is also quite similar to M_3 of *P. medius*.

DISCUSSION: Specimens of *Pseudocylindrodon* from Pilgrim Creek are intermediate in size and morphology between specimens referred to *P.* near *P. tobeyi* (Black, 1974) from Badwater locality 20 dated at 41.2 ± 1.4 m.y. and the sample of *P. medius* from McCarty's Mountain considered to be of earliest Oligocene age. They are more primitive than any of the material referred to *Pseudocylindrodon* from the Vieja Group, Texas (Wood, 1974).

Genus *Cylindrodon* Douglass
Cylindrodon cf. *C. fontis*
Figures 18-20, Table 2

MATERIAL: CM 27545, RP^4; 27541, 27542, 27543, $RM^{1 \text{ or } 2}$; 27533, RP_4; 27544, 27546, $LM_{1 \text{ or } 2}$.

DESCRIPTION AND DISCUSSION: These teeth are all very similar to those of *Cylindrodon fontis* from McCarty's Mountain, Montana. They may be slightly smaller and lower crowned, but the sample size is much too small to be certain of this.

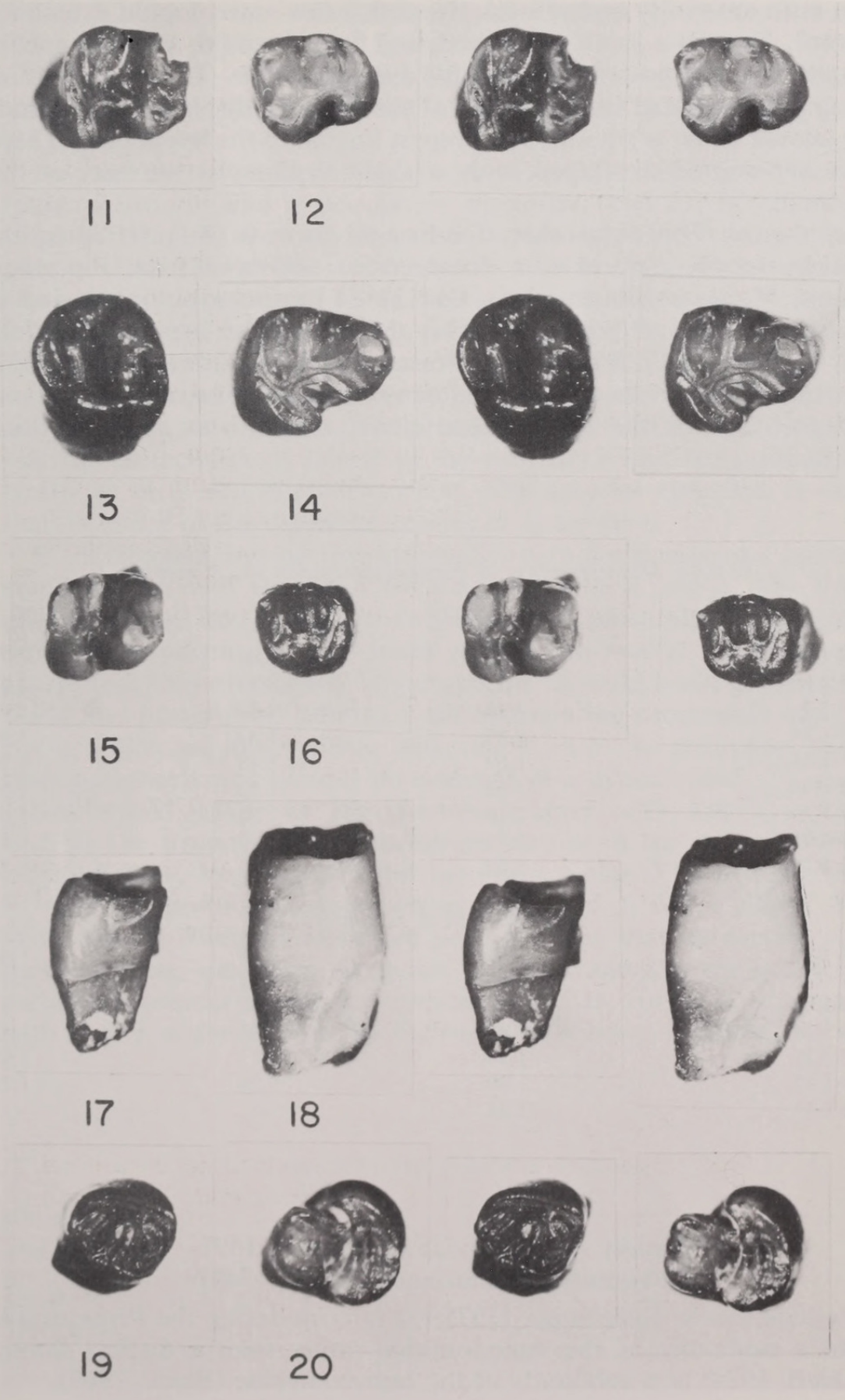
Family ?Sciuridae Gray, 1821
Sciuridae gen. et sp. indet.
Figure 21

MATERIAL: CM 27584, LP_4. (a-p 1.62, tr 1.39, tr 1.39).

DESCRIPTION: In this lower premolar, the metaconid dominates the trigonid, being about twice the size of the protoconid. The trigonid is

→

Figs. 11-12. *Spurimus* sp. All x 7. 11. CM 27549, $RM_{1 \text{ or } 2}$. 12. CM 27526. LM_3. Figs. 13-17. *Pseudocylindrodon* nr. *P. medius*. All x 7. 13. CM 27531, LP^4. 14. CM 27534, LP_4. 15. CM 27538, $RM_{1 \text{ or } 2}$. 16. CM 27539, LM_3. 17. CM 27535, $LM_{1 \text{ or } 2}$. Figs. 18-20. *Cylindrodon* cf. *C. fontis*. All x 7. 18. CM 27544, $LM_{1 \text{ or } 2}$. 19. CM 27543, $RM^{1 \text{ or } 2}$. 20. CM 27533, RP_4.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open both anteriorly and posteriorly, with a low anterolophid extending forward. There is a small mesostylid, and the entoconid, although incorporated into the posteroloph, is still distinguishable. The mesoconid is strong and is located in the middle of the lingually displaced ectolophid. The talonid basin is smooth and deepest lingual to the hypoconid. There is no hypolophid developed, only a slight swelling at the base of the entoconid.

DISCUSSION: The only other Chadronian form to be referred (questionably) to the Sciuridae is *Protosciurus jeffersoni* from Pipestone Springs, Montana (Black, 1965). CM 27584 has no hypolophid, and is 30% smaller than *P. jeffersoni.* The absence of the hypolophid effectively removes CM 27584 from the Prosciurinae, since it is a feature found in virtually all members of the subfamily. In addition, the shape and configuration of the tooth more clearly resembles sciurids than prosciurines.

TABLE 2. MEASUREMENTS OF *Pseudocylindrodon* NR. *P. medius*

CM material	a-p	tr	tr
27531 LP^4	2.00	2.00	1.77
27532 $LM^{1 \text{ or } 2}$	1.73	1.45	1.62
27534 LP_4	2.38	1.43	1.96
27535 $LM_{1 \text{ or } 2}$	1.89	1.49	1.90
27536 $LM_{1 \text{ or } 2}$	1.69	1.48	1.70
27537 $RM_{1 \text{ or } 2}$	1.68	1.42	1.64
27538 $RM_{1 \text{ or } 2}$	2.10	1.35	1.60
27539 LM_3	1.80	1.40	1.63
27540 RM_3	1.63	1.53	1.28
	Cylindrodon cf. *C. fontis*		
27545 RP^4	1.93	1.76	1.43
27541 $RM^{1 \text{ or } 2}$	1.76	1.77	1.77
27542 $RM^{1 \text{ or } 2}$	1.68	1.62	1.83
27543 $RM^{1 \text{ or } 2}$	2.00	1.83	1.62
27533 RP_4	1.79	1.13	1.92
27544 $LM_{1 \text{ or } 2}$	1.89	1.70	1.71
27546 $LM_{1 \text{ or } 2}$	2.32	—	—

Family Aplodontidae Trouessart, 1897
Subfamily Prosciurinae (Wilson, 1949)

We here follow Rensberger (1975:11) in considering the Prosciurinae to be a subfamily of the Aplodontidae rather than a distinct family (Wahlert, 1974) or a subfamily of the Ischyromyidae (Black, 1968).

Genus *Spurimus* Black

Spurimus sp.

Figures 8-12, Table 3

MATERIAL: CM 27552, RdP^4; 27551, LP^4; 27548, LP$_4$; 27549, RM$_{1 \text{ or } 2}$; 27550, LM$_{1 \text{ or } 2}$; 27526, LM$_3$.

DESCRIPTION: The upper dentition is represented by a deciduous fourth premolar and a permanent premolar. The deciduous tooth is broadly triangular with a wide anterior cingulum. The protoloph is complete and the metaloph is incomplete with a distinct metaconule. A small mesostyle is present. There is no hypocone, but rather a wide sweeping posteroloph ending at the posterolingual base of the metacone. There are no other deciduous premolars known for *Spurimus*.

The permanent P^4 is molariform, but has no hypocone. The protoloph and metaloph are complete. The protoconule, however, is not discernible, and the metaconule is joined to the protocone and metacone by thin crests, as in *S. scottii* (Black, 1974). The anterior cingulum is smaller than in either of the described species of *Spurimus*.

P$_4$ is elongate and narrow anteriorly, with the protoconid and metaconid distinct and separated by a notch, as in *S. selbyi*. The hypolophid is strong, and there is a swelling in the posterolophid that represents the hypoconulid. The lower molars are similar to the premolar except that they are slightly larger and the trigonid basin is closed anteriorly and posteriorly, forming a pit between the protoconid and metaconid, which are more widely separated than in the premolar. M$_3$ narrows posteriorly and there is no evidence of a hypoconulid.

DISCUSSION: Many of the characters agree with *Spurimus scottii*, such as the structure of the metaloph, nature of the trigonid, and the large, shallow, buccal groove on the lower molar. The structure of the P$_4$ trigonid, however, is more representative of *S. selbyi* (Black, 1971). With the small sample recovered here it is best that no specific assignment of these specimens be made. A larger sample would reflect the variability present in the population and allow for better comparison with known material from the Badwater, Wyoming, localities.

TABLE 3. MEASUREMENTS OF *Spurimus*

CM material	a-p	tr	tr
27552 RdP^4	2.00	1.68	1.54
27551 LP^4	1.97	2.30	2.23
27548 LP$_4$	2.22	1.34	1.85
27549 RM$_{1 \text{ or } 2}$	2.35	1.95	2.20
27550 LM$_{1 \text{ or } 2}$	2.30	1.64	1.97
27526 LM$_3$	2.20	1.72	1.60

Genus *Prosciurus* Matthew

Prosciurus vetustus

Figures 22-23, Table 4

MATERIAL: CM 27579, $RM^{1 \text{ or } 2}$; 27577, RM^3; 27578, LM^3; 27583, LM^3.

DESCRIPTION AND DISCUSSION: The upper molar teeth have high, relatively free protocones, and hypocones are very small. Mesostyles are present and well developed on all the teeth. The characteristic double metaconules are also present on these teeth. The lower molar is broken, but compares favorably with Black's (1965) description in that it is wide anteriorly, has a well-developed hypolophid and a small mesostylid, and the metaconid is continuous anteriorly with the anterior cingulum.

These four teeth agree with Black's (1965) and Wood's (1937) description of *P. vetustus*. The presence of the double metaconules and the appropriate size leave little doubt that this assignment is correct.

Prosciurus cf. *P. relictus*

Figure 24

MATERIAL: CM 27576, $RM^{1 \text{ or } 2}$ (a-p 1.92, tr 1.31, tr 1.31).

DESCRIPTION: This single specimen differs, by the presence of a lingual cingulum and the absence of a mesostyle, from other prosciurines recovered. Wood (1937) discusses a similar form from Pass Creek, Montana, of about the same size, that has a lingual cingulum, but also a small mesostyle. The absence of the mesostyle is a character found in *P. saskatchewaensis* (Wood, 1937). *P. saskatchewaensis,* however, is somewhat larger and does not possess the lingual cingulum.

DISCUSSION: The presence of this form in these earliest Oligocene sediments further complicates the prosciurine picture. It is the right size and has the same lingual cingulum as *P.* cf. *P. relictus* (Wood, 1937), but it lacks the mesostyle. Presence or absence of a mesostyle is known to be a variable character in some groups of rodents and we have therefore assigned this tooth to Wood's *P.* cf. *P. relictus,* based on the development of the lingual cingulum and the size.

Prosciurus sp.

Figures 25-27, Table 3

MATERIAL: CM 27580, $LM^{1 \text{ or } 2}$; 27585, $RM^{1 \text{ or } 2}$; 27581, LP_4 .

DESCRIPTION: The upper molars are slightly anteroposteriorly compressed, with well developed protocones, protoconules, and single metaconules. Comparisons with *P. relictus* (KU 545, P^4 - M^1 from the Brulé of Nebraska) indicate that CM 27580 is more transverse, and that the lingual margin of the anterior cingulum is not as well developed.

CM 27585 is slightly larger than *P. relictus* and has a better development of the hypocone and a more prominent mesostyle.

The lower premolar is quite distinctive, with a high open trigonid, exceptionally well-developed metastylid and metaconid, short slit-like talonid, and a short hypolophid appressed to the posterolophid. The protoconid and metaconid are well developed and set much more widely than in *P. relictus,* resulting in a nearly square occlusal outline of the tooth.

DISCUSSION: These teeth, while probably not representing the same species, show peculiarities that do not allow their ascription to any form thus far reported: (1) The upper molars, while agreeing most closely with *P. relictus,* are more transverse, and differ in construction of the anterior cingulum; (2) the metastylid, trigonid, and talonid basin of the lower premolar are distinctly different from those in any described form.

TABLE 4. MEASUREMENTS OF *Prosciurus*

CM material	a-p	tr	tr
Prosciurus vetustus			
27579 $M^{1 \text{ or } 2}$	2.0*	2.32*	2.32
27577 RM^3	1.80	2.10	1.80
27578 LM^3	2.05	2.15	2.15
27583 LM_3	2.00	1.62*	—
Prosciurus sp.			
27580 $LM^{1 \text{ or } 2}$	1.37*	—	1.90
27585 $RM^{1 \text{ or } 2}$	1.78*	2.50	2.33
27581 LP_4	1.95	1.47	1.71*

*Specimens damaged.

Family Heteromyidae Allen and Chapman, 1893
Genus *Heliscomys* Cope
Heliscomys cf. *H. vetus*
Figure 28, Table 5

MATERIAL: CM 27547, LP^4 - M^1.

DESCRIPTION: This single maxillary fragment was the only *Heliscomys* material recovered from the Pilgrim Creek deposits. The upper premolar is typical of *Heliscomys,* being triangular in occlusal outline. There is a short posterior cingulum connecting the base of the hypocone and metacone, and there is a small accessory cuspule developed anteroexternal to the protocone. The cuspule is similar to that described by Wood (1935) for *H. gregoryi.*

The molar is wider than long, with a well-developed anterior cingulum passing lingually, ending in a weakly defined protostyle. A short posterior cingulum is also present. The transverse valley is deeper than the antero-posterior valleys, and is not blocked lingually. The paracone and metacone are set anteriorly respective to their lateral counterparts. All the cusps are distinct and free for most of their height.

DISCUSSION: CM 27547 is a good match for the specimens described by Black (1965) from Pipestone Springs, Montana, but is more transverse. USNM 181413, not seen by Black, is similar to other Pipestone specimens, but the central valley is blocked lingually. The presence of the accessory cuspule and the blocking of the central valley are characters that occur randomly in populations of *Heliscomys*. Galbreath (1953) indicated that his sample of *H. vetus* from NE Colorado contained specimens with these characteristics. After looking at a large sample of *Heliscomys* collected by Galbreath since 1953 we find that these characters do occur in various states of development throughout the population. With this in mind it may be worthwhile to re-examine other species of *Heliscomys,* such as *H. gregoryi,* where these characters are considered to be diagnostic.

TABLE 5. MEASUREMENTS OF *Heliscomys* cf. *H. vetus*

	CM 27547	
	P^4	M^1
a-p	0.85	p.88
tr	0.60	1.07
tr	1.07	1.07

Family indet.
Genus *Griphomys* Wilson, 1940
Griphomys sp.
Figure 29

MATERIAL: CM 27527, RM_3 (a-p 1.27, tr 1.15, tr 1.05).

DESCRIPTION: The lower molar is rectangular with a metalophid and hypolophid formed by anteroposterior compression of the primary cusps. The anterior cingulum is complete, there is no metaconid, and the ectolophid is incomplete. The tooth is essentially bilophate in structure.

DISCUSSION: *Griphomys* has been reported in the literature only from the Sespe Formation in California (Wilson, 1940; Lindsay, 1968). Wilson had no third molars in his sample, but Lindsay's specimen (UCMP 79479) shows a better development of the anterior cingulum than our CM 27527. UCMP 79479 also has a short lophid running anteriorly from the midline of the metalophid. CM 27527 has a lophid extending from the hypoconid into the central basin. The Pilgrim Creek

specimen is slightly larger (0.10 mm) in all dimensions than the California material. This occurrence provides little to help explain the problematical nature of *Griphomys* but does indicate that it was more widespread than originally thought. It has also been tentatively noted to occur in the late Eocene Badwater faunas (M.R. Dawson, personal communication). If this record proves to be *Griphomys,* its history becomes more complicated, existing in the late Eocene of California and Wyoming and surviving into the early Oligocene, at least in Wyoming.

Wood (1974:79-90) has suggested that *Griphomys* and *Meliakrouniomys* are related, and that both are members of the family Eomyidae. Emry (1972) placed *Meliakrouniomys* in the Heteromyidae. One new tooth of *Griphomys* from Pilgrim Creek, Wyoming, has no bearing on the familial position of the genus. We have therefore left *Griphomys* without familial assignment.

Family ?Castoridae Gray, 1821
Genus *Pipestoneomys* Donohoe
Pipestoneomys cf. *bisulcatus*
Figure 30

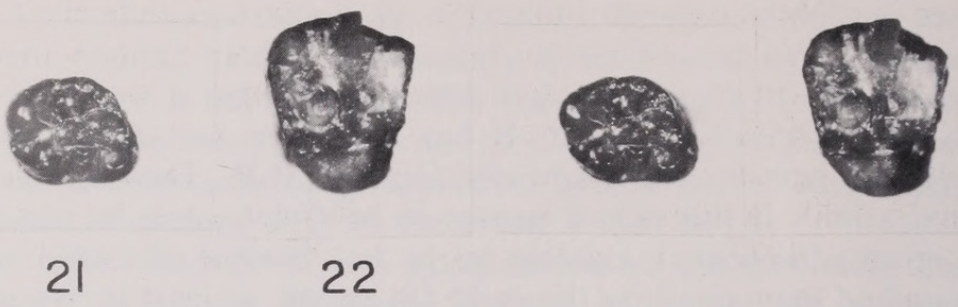
MATERIAL: CM 27575, RM^2 (a-p 1.70, tr 1.23, tr 0.88).

DESCRIPTION: The paracone is the highest of the primary cusps, and the metacone is smaller and more lingually displaced. Both the protocone and hypocone are low and lophlike and are continuous with the anteroloph and posteroloph, respectively. A deep lingual groove is continuous, with an anterior lake system that opens labially between the paracone and anteroloph. There are two lakes in this system, one labial and one lingual, forming an hourglass shape between the paracone and protocone. The mesoloph extends from the anterior arm of the hypocone to the posterior margin of the paracone. The metaloph is complete and extends from the hypocone to the base of the metacone and the posteroloph, isolating two posterior lakes.

DISCUSSION: *Pipestoneomys* is known from two other localities in North America: Pipestone Springs, Montana (Donohoe, 1956; Black, 1965), and Crawford, Nebraska (Alf, 1962). This single occurrence of *Pipestoneomys* adds little to the understanding of the genus, but does compare favorably with Donohoe's (1956) description of *P. bisulcatus* except for crown proportions. CM 27575 is much less transverse, especially across the metaloph, where it tapers to meet what must be a small M^3.

AGE OF THE PILGRIM CREEK FAUNA

The faunal evidence seems to indicate that the Pilgrim Creek locality is of earliest Oligocene age. The majority of forms discussed here agree reasonably well with those found in either the Pipestone Springs local



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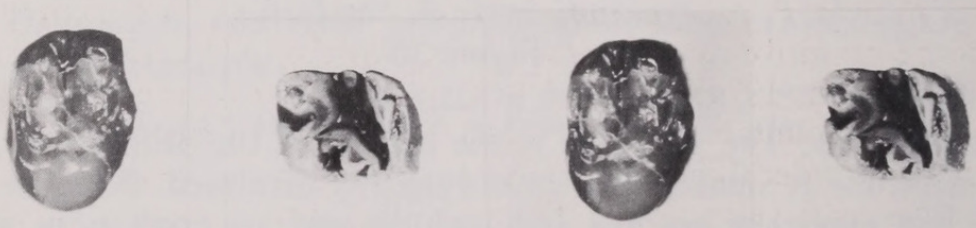
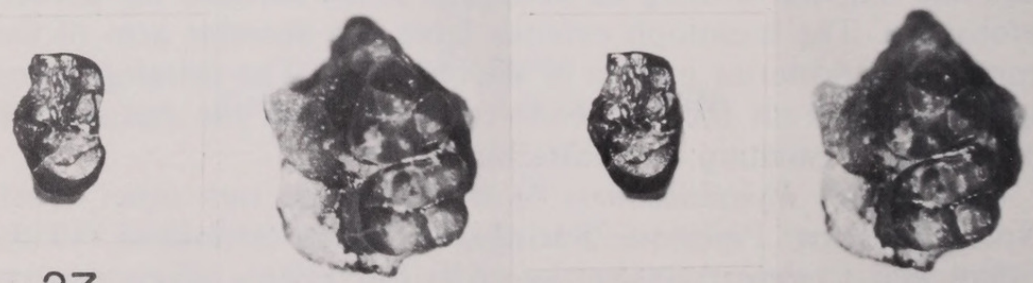


25 26



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29 30

fauna or the McCarty's Mountain fauna, both of Chadronian age in Montana. None of the Kishenehn, La Point, or Cypress Hills faunas have comparable rodent assemblages, so comparisons are difficult. Once the Bates Hole rodents are described, more accurate age assignments for other early Oligocene assemblages will be possible, as the Bates Hole sequence provides a number of K-Ar dates through the White River Formation (Emry, 1973). The ischyromyid material would indicate an age slightly older than either of these localities since there seems to be a "mix" of characters of *I. douglassi* and *I. veterior* in the same population, allowing for speculation concerning the ancestral nature of the Pilgrim Creek specimens. The prosciurines do not present a clear picture of the age of this fauna, since there are representatives that compare closely to the Orellan *P. relictus.*

Griphomys, while represented by only one tooth, is known only from the Eocene of California and tentatively from Locality 20 at Badwater, Wyoming (41.2 m.y.). The cylindrodonts, especially *Pseudocylindrodon,* are intermediate in size and morphology between those from Badwater, *P.* near *P. tobeyi,* and *P. medius* of McCarty's Mountain. They are more primitive than the *Pseudocylindrodon* material from the Vieja Group (Wood, 1974, 33-46). They suggest an age slightly older than McCarty's Mountain for this fauna. Therefore, it seems probable that this fauna is older than McCarty's Mountain, considered to be of earliest Oligocene age, yet younger than the Badwater Locality 20 fauna of latest Eocene age. The faunal elements not discussed in this contribution, as well as those covered here seem to indicate a very early Oligocene age for this fauna, perhaps earlier than for any fauna yet reported for the Oligocene.

ACKNOWLEDGEMENTS

The authors thank the Jackson Hole Biological Research Station (University of Wyoming and New York Zoological Society), under the direction of Dr. L. Floyd Clarke (1971-72) and Dr. Oscar Paris (1973-74), for providing research space and living accommodations during the course of this study. We also wish to thank Jere Sutton and Kris Krishtalka for invaluable field service in collecting and transporting the

Fig. 21. ?Sciuridae, CM 27584, LP_4, x 7. Figs. 22-23. *Prosciurus vetustus.* All x 7. 22. CM 27579, $RM^{1 \text{ or } 2}$. 23. CM 27578, LM^3. Fig. 24. *Prosciurus* cf. *P. relictus,* CM 27576, $RM^{1 \text{ or } 2}$, x 7. Figs. 25-27. *Prosciurus* sp. All x 7. 25. CM 27585, $RM^{1 \text{ or } 2}$. 26. CM 27581, LP_4. 27. CM 27580, $LM^{1 \text{ or } 2}$. Fig. 28. *Heliscomys* cf. *H. vetus,* CM 27547, LP^4 - M^1, x 10. Fig. 29. *Griphomys* sp. CM 27527, RM_3, x 15. Fig. 30. *Pipestoneomys* cf. *P. bisulcatus,* CM 27575, RM^2, x7.

matrix. In addition, we express our appreciation to the National Forest Service for permission to carry out this work in the Teton Wilderness Area. The authors have both benefitted greatly from discussions and field excursions with Dr. J. D. Love of the U. S. Geological Survey. Specimens were loaned by Dr. Larry D. Martin, University of Kansas; Dr. Robert Emry, National Museum of Natural History; and Dr. E. C. Galbreath, Southern Illinois University.

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